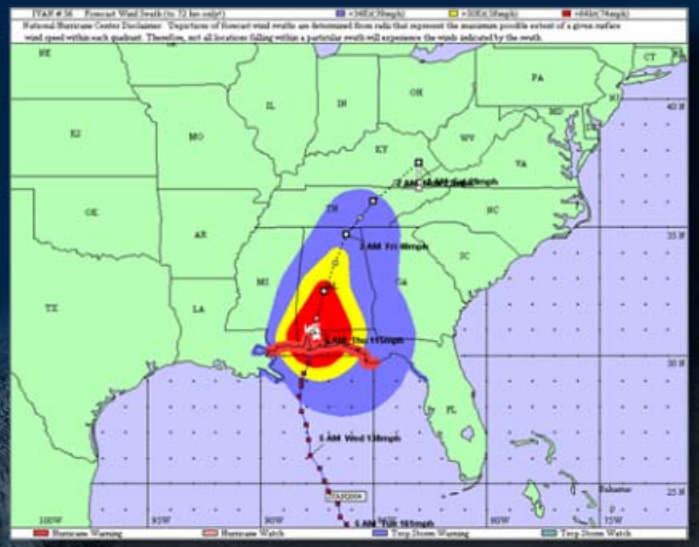
Application of HAZUS-MH to Support Disaster Operations in Hurricane Ivan

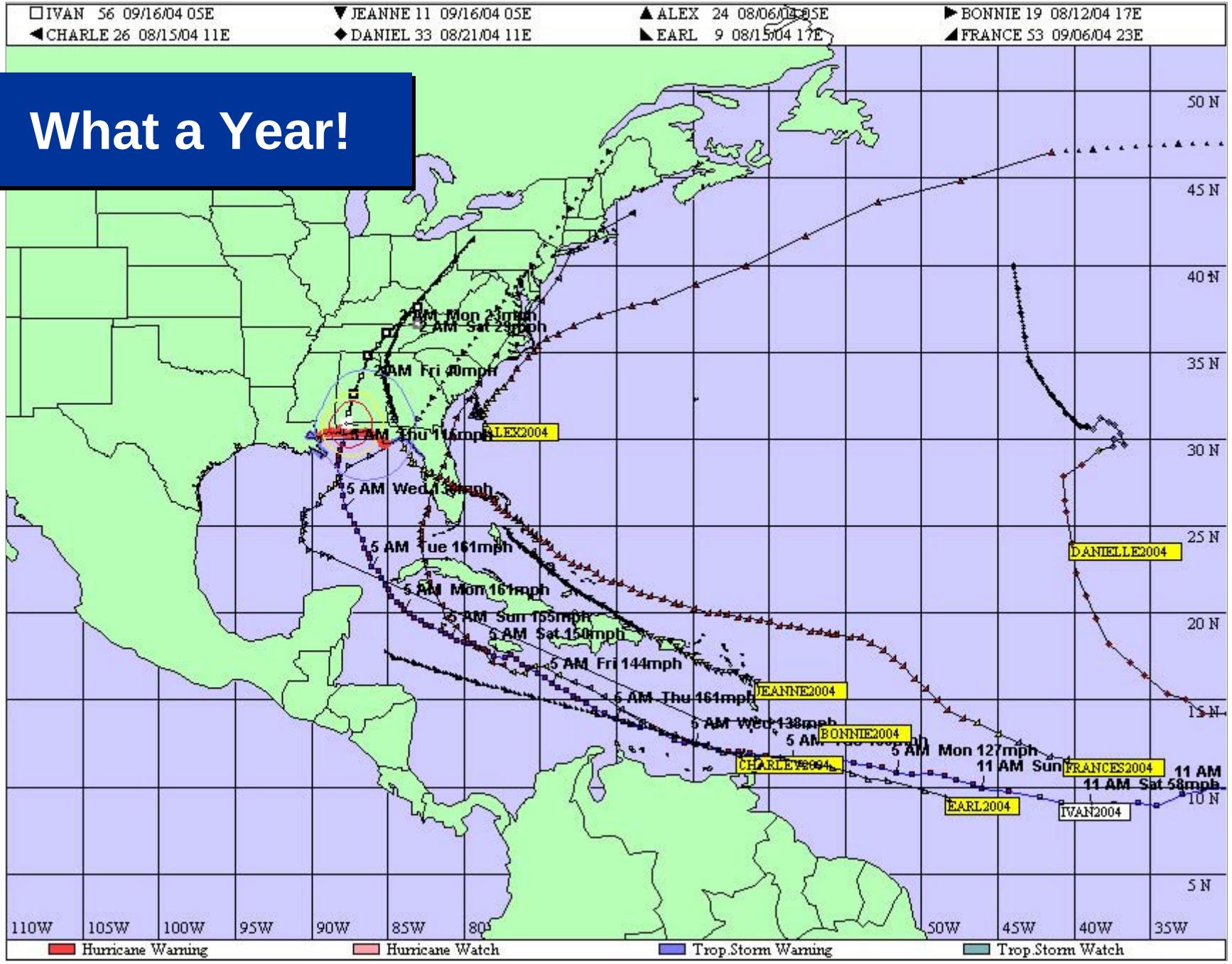


Presented to National Capital Region
HAZUS-MH Users Group (HUG)

FEMA

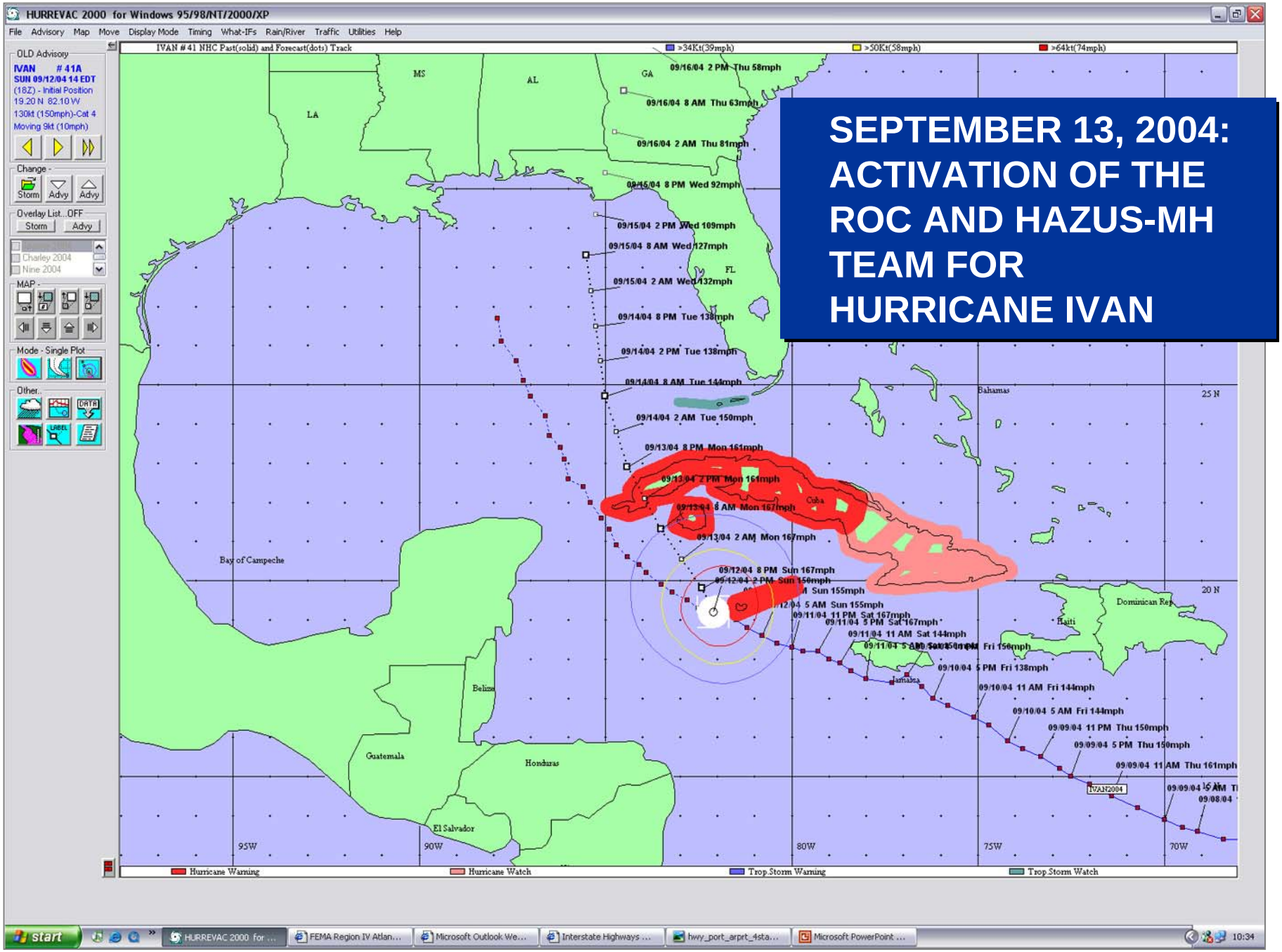
September 24, 2004

What a Year!


IVAN 56 09/16/04 05E
JEANNE 11 09/16/04 05E
ALEX 24 08/06/04 05E
BONNIE 19 08/12/04 17E
CHARLE 26 08/15/04 11E
DANIEL 33 08/21/04 11E
EARL 9 08/15/04 17E
FRANCE 53 09/06/04 23E
50 N
45 N
40 N
35 N
30 N
25 N
20 N
15 N
10 N
5 N
110W
105W
100W
95W
90W
85W
80
50W
45W
40W
35W
5 AM Mon 23mph
5 AM Sat 23mph
5 AM Fri 40mph
5 AM Thu 115mph
ALEX2004
5 AM Wed 138mph
5 AM Tue 161mph
5 AM Mon 161mph
5 AM Sun 155mph
5 AM Sat 150mph
5 AM Fri 144mph
5 AM Thu 161mph
JEANNE2004
5 AM Wed 138mph
BONNIE2004
5 AM Mon 127mph
11 AM Sun
FRANCES2004
11 AM
11 AM Sat 58mph
EARL2004
IVAN2004
DANIELLE2004
Hurricane Warning
Hurricane Watch
Trop.Storm Warning
Trop.Storm Watch

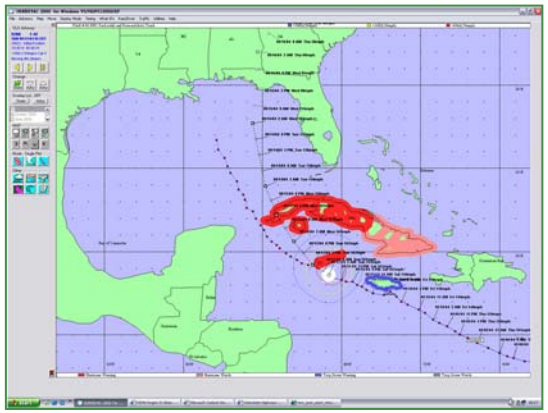
Application of HAZUS-MH to Support Disaster Operations

- Hurricanes Charley, Frances, and Ivan
- Provide HAZUS-MH Support for Emergency
- Response and Initial Recovery
- Validate model results through post-disaster surveys of damage

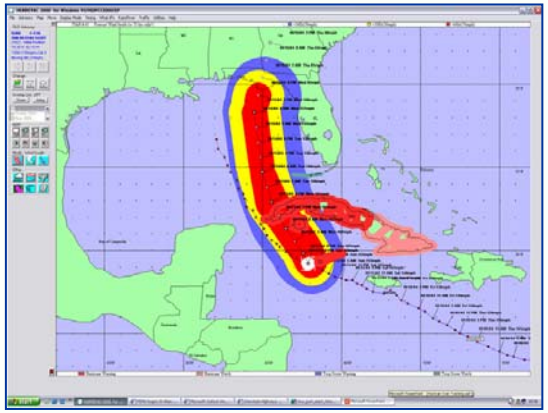


SEPTEMBER 13, 2004: ACTIVATION OF THE ROC AND HAZUS-MH TEAM FOR HURRICANE IVAN

Application of HAZUS-MH at the ROC Hurricane Ivan

Storm Status September 12	ROC Activity	HAZUS-MH Analyses
 CAT 4 Storm	**HAZUS-MH Team Activated:** Joe Rachel, FEMA Doug Bausch, FEMA Rich Hansen, FEMA Tom Durham, PBS&J Eduardo Escalona, PBS&J	**Following each advisory:** ▪ Map of Estimated Peak Wind Gust Speeds (following NHC advisories) ▪ Quick Assessment Reports

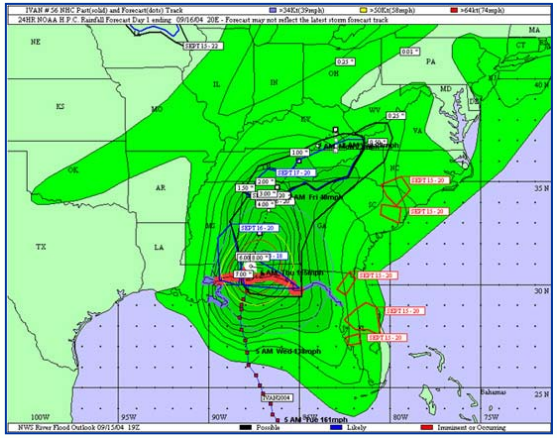
Application of HAZUS-MH at the ROC Hurricane Ivan

Storm Status September 14	ROC Activity	HAZUS-MH Analyses
 **CAT 5 Storm** **Sustained winds of 140 mph**	**Priorities:** ▪ Adjust hazard parameters in consultation with FEMA HQ ▪ Brief ROC at shift change ▪ Initiate SLOSH runs (storm surge) ▪ Routinely consult with Emergency Support Function (ESF) personnel	**Following each advisory:** ▪ Peak Gust Winds ▪ Hospital Functionality ▪ School Functionality ▪ Debris Estimates ▪ Displaced Households ▪ Short-Term Shelter ▪ Population at Risk

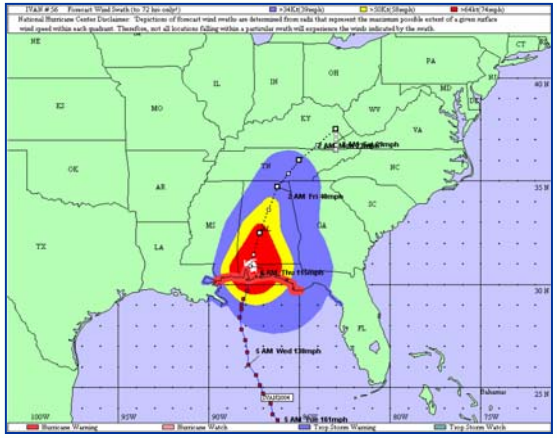
ESF Consultation Following Each Advisory

HAZUS Analysis	Customer
Short-Term Shelter Requirements	Red Cross
Displaced Households	Red Cross
Debris – Concrete & Steel	USAR
Hospital Functionality	Medical & Health
Debris – All Categories	USACE
Residential Losses	FEMA (HS)
Losses to Manufactured Housing	FEMA (HS)
Profiles of Population at Risk	FEMA & ARC

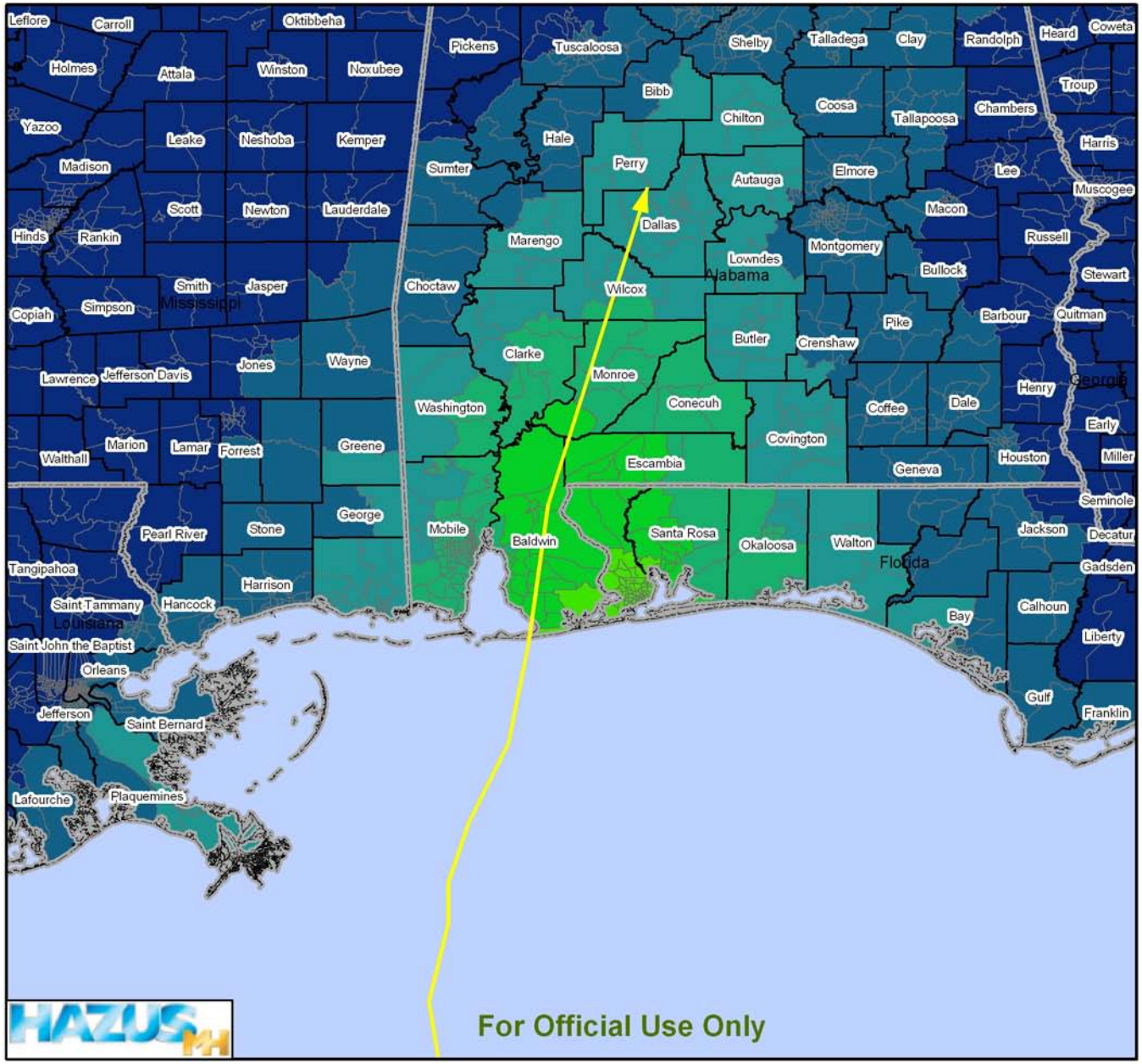
Application of HAZUS-MH at the ROC Hurricane Ivan

Storm Status September 16	ROC Activity	HAZUS-MH Analyses
 ▪ Landfall forecast at 2:30 am ▪ Track takes storm to west of Mobile Bay ▪ Storm surge expected to approach 15 feet	**Priorities:** ▪ Overlaying SLOSH with HAZUS inventory and population at risk ▪ Estimates for life saving ESFs (Medical, Mass Care, Debris, USAR) ▪ Continued consultations with Emergency Services ESFs and Planning and Information	**Following Advisories:** ▪ Peak Gust Winds ▪ Population at Risk ▪ Hospital Functionality ▪ School Functionality ▪ Debris Estimates ▪ Displaced Households ▪ Short-Term Shelter ▪ Exposure to actual surge (SLOSH)

Application of HAZUS-MH at the ROC Hurricane Ivan

Storm Status September 17	ROC Activity	HAZUS-MH Analyses
 ▪ Landfall at Gulf Shores, AL as CAT 3 storm ▪ Storm surge concentrated east of Mobile Bay	**Priorities:** ▪ Run final HAZUS-MH analyses with parameters provided by HQ and ARA ▪ Consult with ESFs (USAR, Medical, Debris, Mass Care) ▪ Provide analyses to ESF 5 in impacted states	**Following Advisories:** ▪ Peak Gust Winds ▪ Population at Risk ▪ Hospital Functionality ▪ School Functionality ▪ Debris Estimates ▪ Displaced Households ▪ Short-Term Shelter ▪ Exposure to actual surge (SLOSH)

Estimated Peak Gust Wind Speeds: Hurricane Ivan



Final Windfield
9-17-04 11:00 EST

Current Hurricane Track

Previous Advisory Tracks

Peak Gust Wind Speeds (mph)

- < 50
- 51 - 65
- 66 - 80
- 81 - 95
- 96 - 110
- 111 - 125
- 126 - 140
- 141 - 155
- 156 - 170
- 171 - 185
- 185 - 200
- > 200

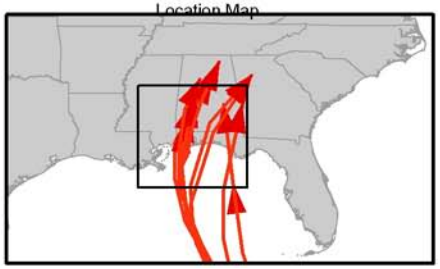
Counties

State Boundaries

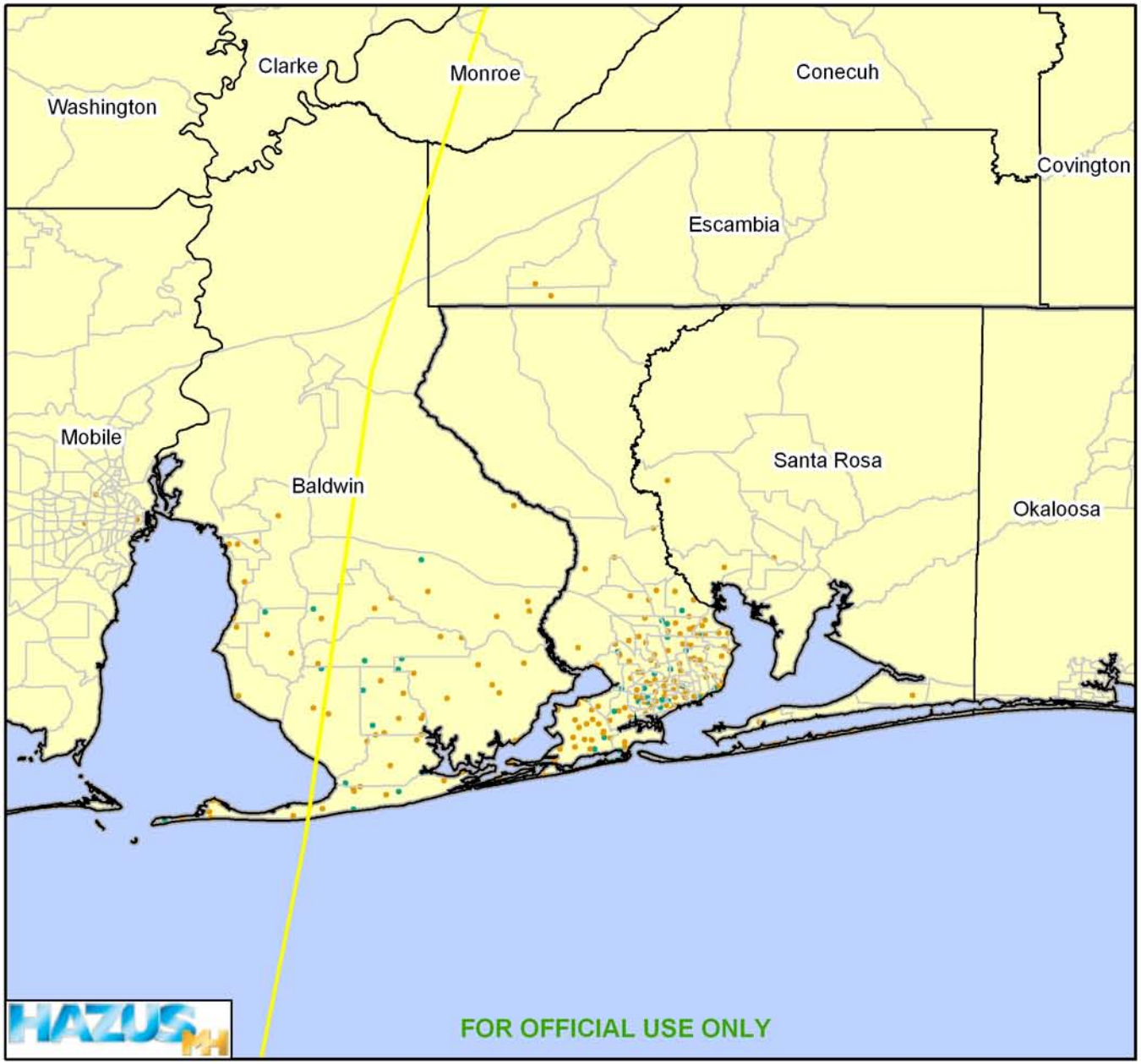
N

0 20 40 80 Miles

Location Map



Estimated Displaced Households & Short-Term Shelter Needs: Hurricane Ivan



Final Windfield
9-17-04 11:00 EST

ESTIMATED TOTALS

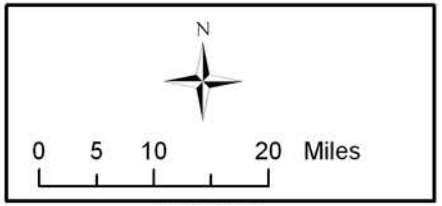
Displaced Households

Alabama	750
Florida	2,400
Louisiana	0
Mississippi	0

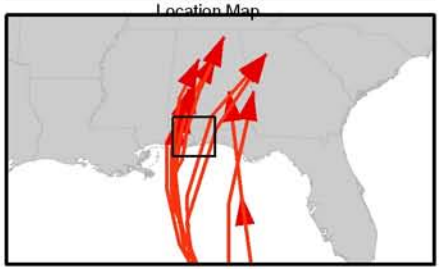
Short-Term Shelter Needs

Alabama	200
Florida	600
Louisiana	0
Mississippi	0

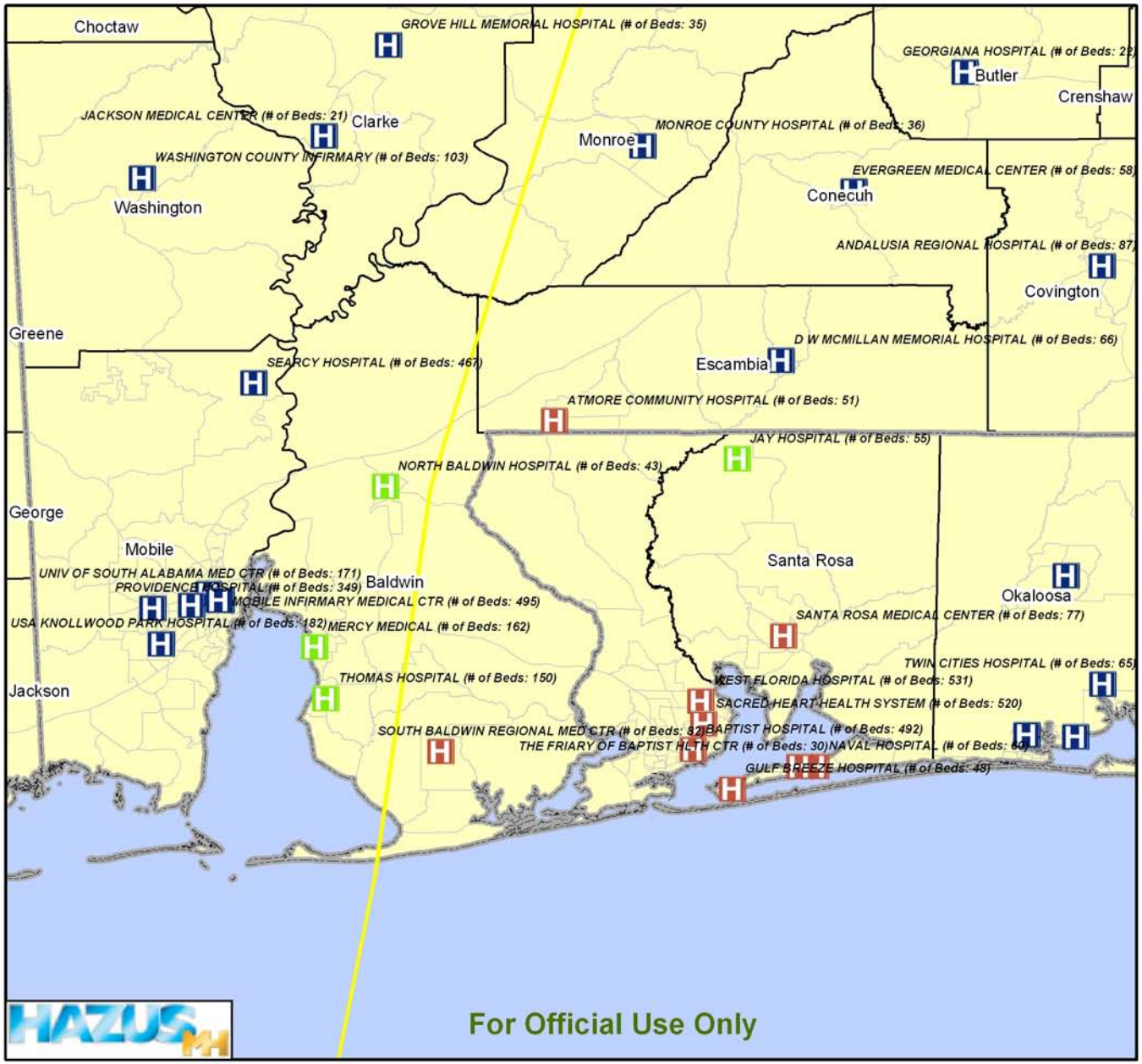
- Hurricane Track
- Previous Advisory Tracks
- 1 Dot = 10
- Shelter Needs (Individuals)
- Displaced Households
- Census Tracts
- County Boundaries
- State Boundaries



Location Map



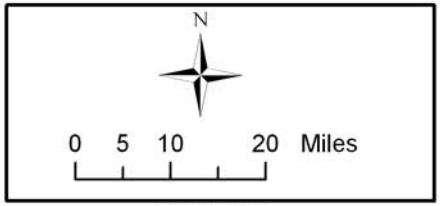
Hospitals - Potential Loss of Use: Hurricane Ivan



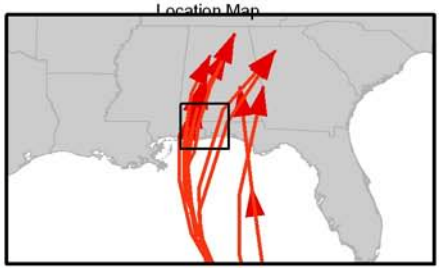
Final Windfield
9-17-04 11:00 EST

Loss of Use (Days)

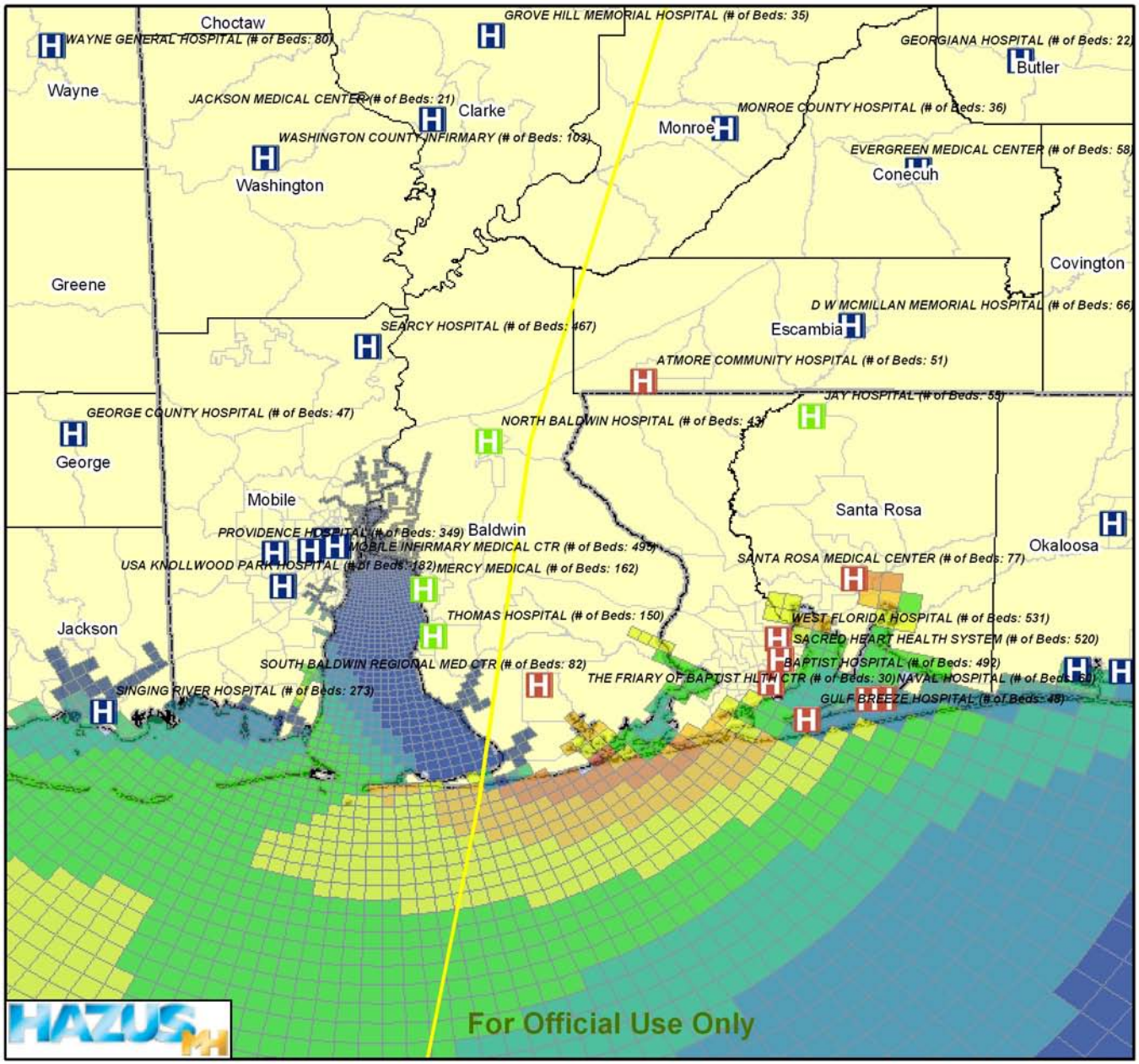
- < 3
- 3 - 7
- > 7
- Current Hurricane Track
- Previous Advisory Tracks
- Census Tracts
- County Boundaries
- State Boundaries



Location Map



Hospitals - Potential Loss of Use: Hurricane Ivan



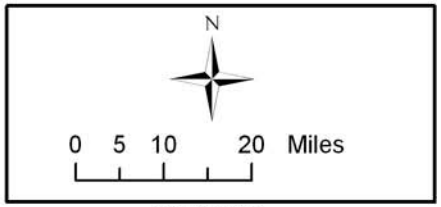
Final Windfield
9-17-04 11:00 EST

HospitalLoss.LossOfUse

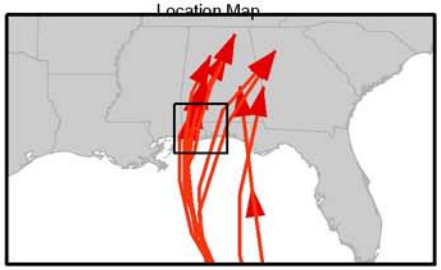
- < 3
- 3 - 7
- > 7
- Current Hurricane Track
- Previous Advisory Tracks
- Census Tracts
- County Boundaries
- State Boundaries

Storm Surge (Feet)

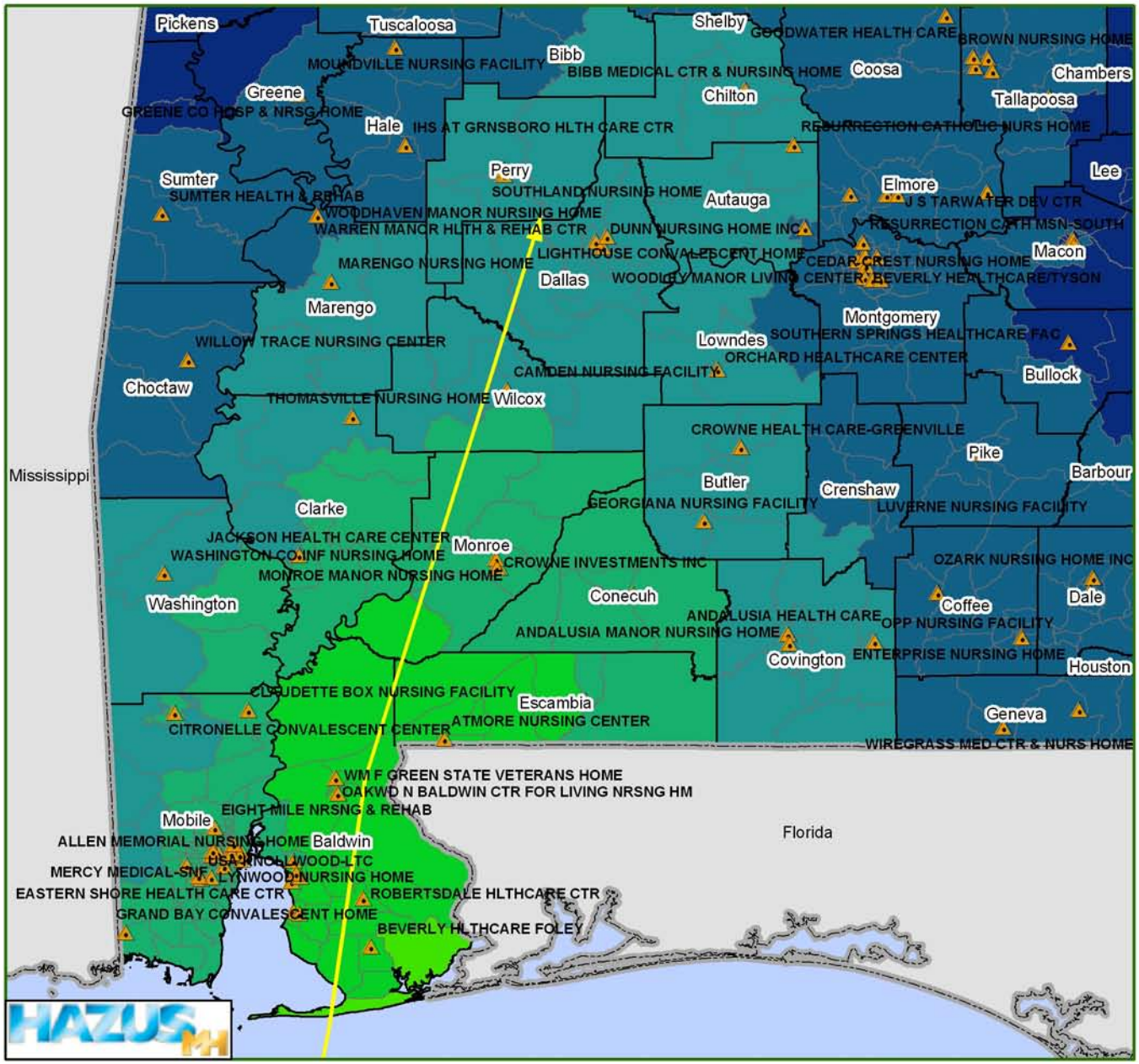
- 0.0 - 1.0
- 1.1 - 2.0
- 2.1 - 3.0
- 3.1 - 4.0
- 4.1 - 5.0
- 5.1 - 6.0
- 6.1 - 7.0
- 7.1 - 8.0



Location Map



AL - Nursing Home Wind Exposure: Hurricane Ivan



Final Windfield
9-17-04 11:00 EST

Nursing Homes
Current Hurricane Track
Previous Advisory Tracks

PeakGusts

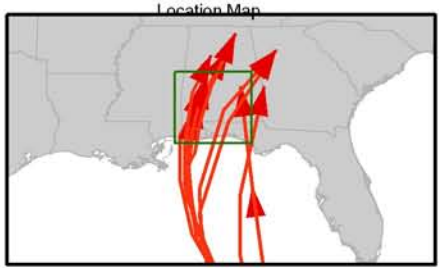
- < 50
- 51 - 65
- 66 - 80
- 81 - 95
- 96 - 110
- 111 - 125
- 126 - 140
- 141 - 155
- 156 - 170
- 171 - 185
- 185 - 200
- > 200

Census Tracts
County Boundaries
State Boundaries

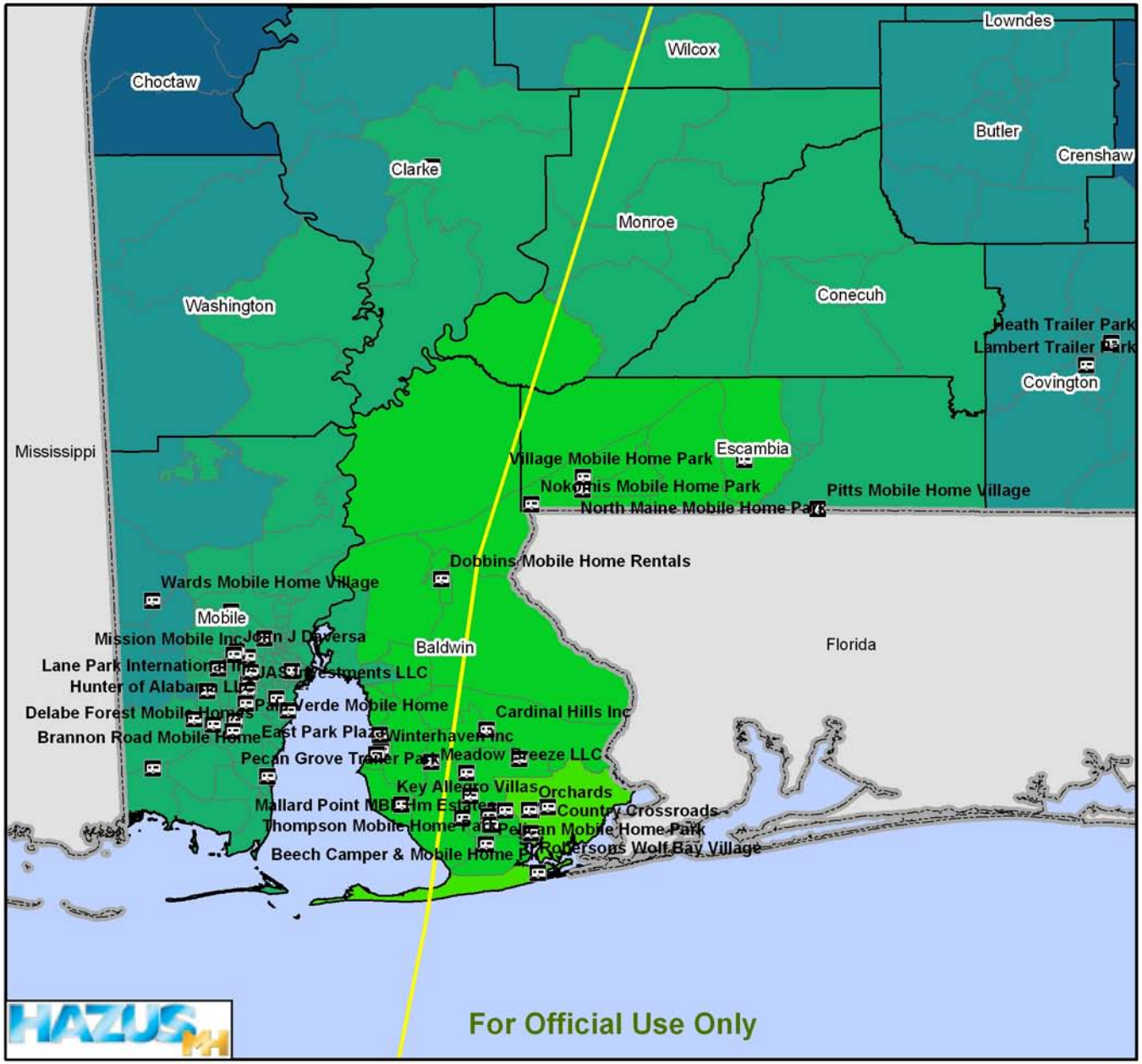
N

0 5 10 20 Miles

Location Map



AL - Mobile Home Wind Exposure: Hurricane Ivan

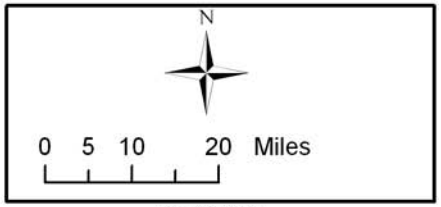


Final Windfield
9-17-04 11:00 EST

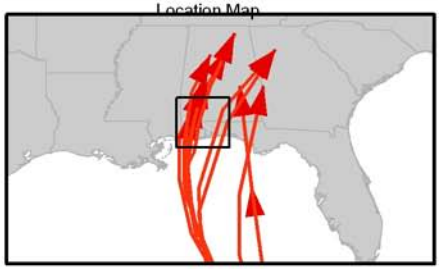
- Mobile Home Parks
- Current Hurricane Track
- Previous Advisory Tracks

PeakGusts

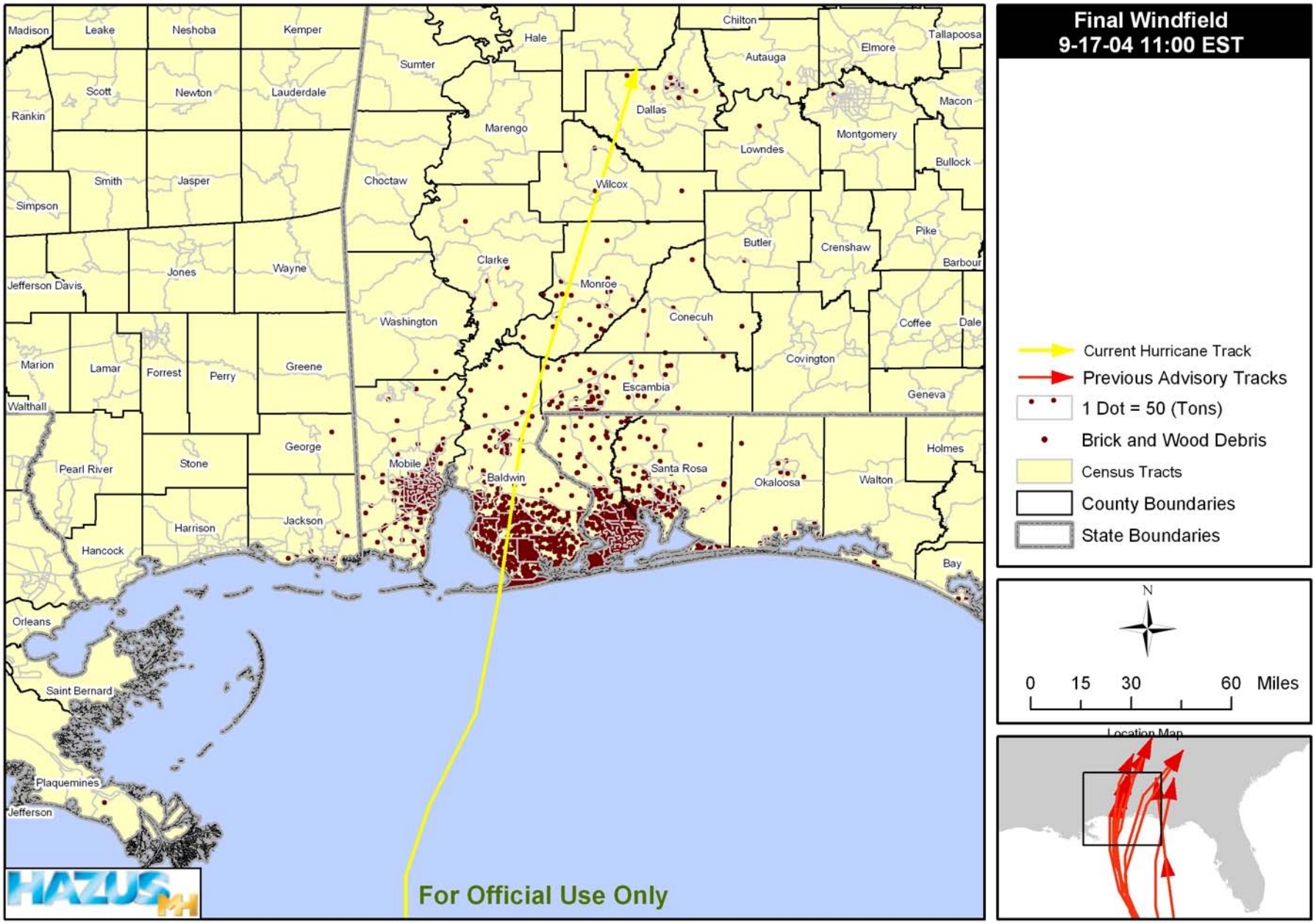
- < 50
- 51 - 65
- 66 - 80
- 81 - 95
- 96 - 110
- 111 - 125
- 126 - 140
- 141 - 155
- 156 - 170
- 171 - 185
- 185 - 200
- > 200
- Census Tracts
- County Boundaries
- State Boundaries



Location Map



Estimated Brick and Wood Debris: Hurricane Ivan



Final Windfield
9-17-04 11:00 EST

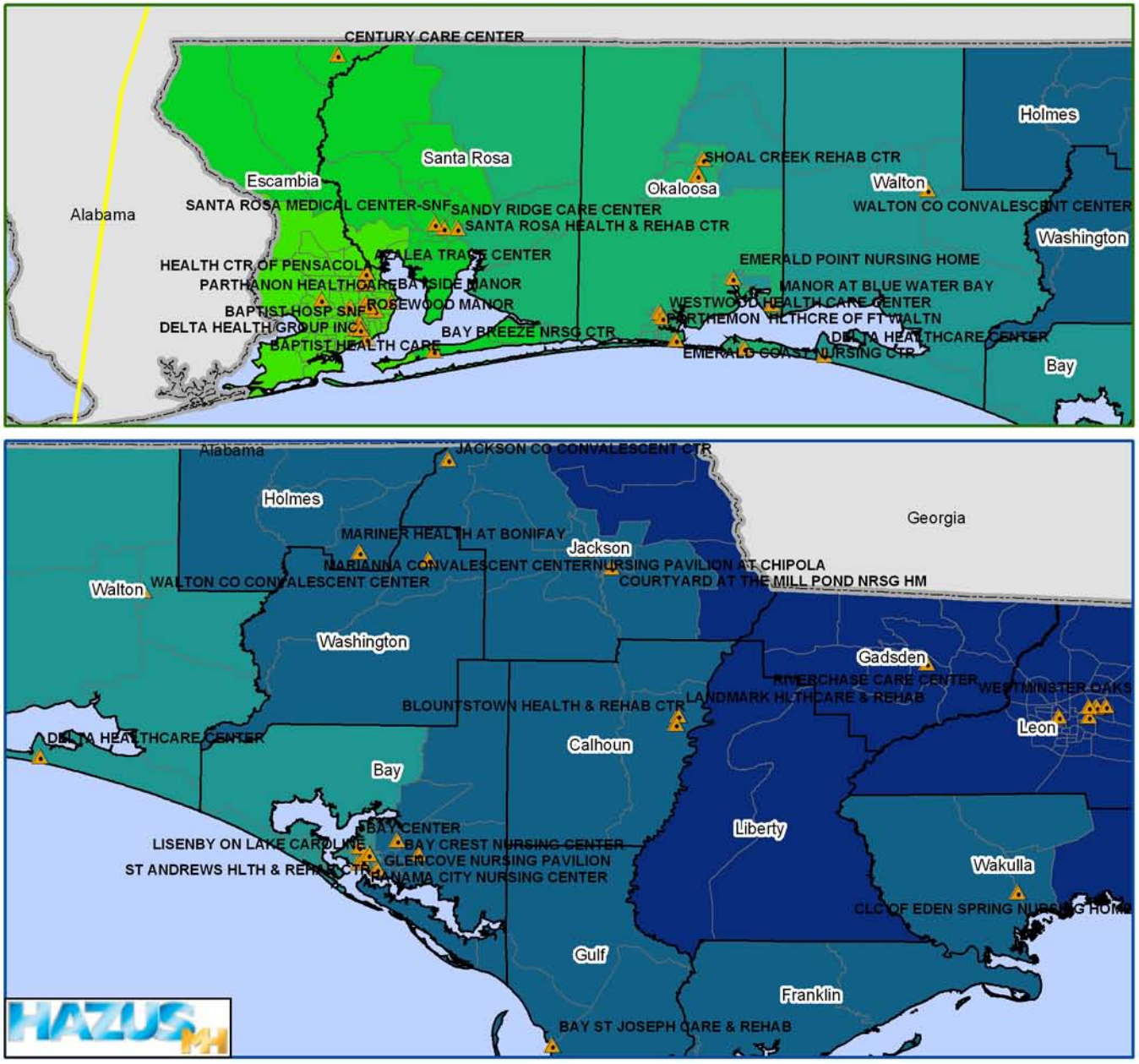
- Current Hurricane Track
- Previous Advisory Tracks
- 1 Dot = 50 (Tons)
- Brick and Wood Debris
- Census Tracts
- County Boundaries
- State Boundaries

N

0 15 30 60 Miles

Location Map

FL Panhandle - Nursing Home Wind Exposure: Hurricane Ivan



Final Windfield
9-16-04 11:00 EST

- nursing_homes
- Current Hurricane Track
- Previous Advisory Tracks

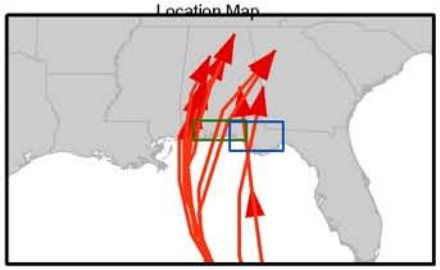
PeakGusts

- < 50
- 51 - 65
- 66 - 80
- 81 - 95
- 96 - 110
- 111 - 125
- 126 - 140
- 141 - 155
- 156 - 170
- 171 - 185
- 185 - 200
- > 200
- Census Tracts
- County Boundaries
- State Boundaries

N

0 5 10 20 Miles

Location Map



Lessons from HAZUS-MH Applications

- Sensitivity of the model to hazard input
- Staffing requirements for 24 hour operation
- Importance of ongoing “ESF Consultations”
- Value of user-supplied data (State and Federal supplied)
- Coordination with FEMA HQ (adjustments in hazard input)
- Potential issues with multiple HAZUS users in evolving event
- Importance of immediate model validation (field surveys)